ERIC Document Resume | See Instruction Sheet | DATE OF RESUME | DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER: ED001415
2. ORIGINATOR CONTROL NO(S).: SC 1859
3. IDENTIFICATION NO.: N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S): Pressey, Sidney L.

MICROFILM COPY AVAILABLE: YES ☒ NO ☐

5. TITLE OF DOCUMENT ABSTRACTED: A Puncture of the Huge "Programming" Boom?

COPYRIGHT GRANTED: YES ☐ NO ☒

6. PUBLICATION TITLE: N.A.

COPYRIGHT RELEASE FILED: YES ☐ NO ☐

7. EDITOR(S): N.A.

8. PLACE OF ORIGIN: University of Arizona
ORG. Tucson, Arizaon
ST.
CITY, STATE
TELE. EXT.
INST/LOC CODE

TYPE OF REPORT: PROPOSAL ☐ IN-PROGRESS ☐ FINAL ☒ FOLLOW-UP ☐

9. PUBLISHER OR SOURCE: University of Arizona, Tucson, Arizona

OTHER ERIC REFERENCES:

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	4/63	7

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR: research

16. INDEXING TERMS (6-12)

auto-instructional aids
programmed texts
converting texts
study-reading processes
learning theory
auto-instructional labs

17. ABSTRACT (MAX. 250 WORDS)

Research in programmed learning reveals that it is usually no more efficient than the usual study-reading, and is always more clumsy and expensive. Trial of an alternate auto-instructional procedure is reported. Issues of learning theory and educational practice are raised.

A programmed set of 1110 words was converted to six succinct paragraphs totaling 360 words. Four groups were tested: a control group, with no preparation; a group using the programmed text; a group using the six paragraph statement; and a group using the six paragraph statement with six elucidative questions. The secion using the text unit made a significant gain over the control group. However, in one-tenth the time required to go through the "program," students simply reading the substance of it learned a great deal. When that substantive statement was supplemented by only six questions, they did a bit better. Analysis showed that the auto-instructional question, differentiating simple reflexes from learned responses, reduced mistakes in this matter on the end-test by over half.

Auto-instruction which facilitates and clarifies such study-reading processes, instead of clumsily fragmenting them, can greatly aid learning. All the readings and laboratory exercises in a course were covered in duplicate by adjunct auto-instructional "teach" tests. These, and all the materials of the course, were made available to superior students in an auto-instructional lab. There was no teaching, but an instructor was placed in charge to help if asked. Students finished the 12-week course in six weeks, and half made grades of "A".

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION

20. DIVISION OR DEPT.

21. CONTRACT NO.

PROJECT NO.

22. TOTAL COST OF PROJECT

23. DURATION OF PROJECT

U.S. Department of Health, Education, and Welfare
Office of Education

ERIC Form 1

INSTRUCTIONAL TECHNOLOGY - U.S.C.

Apr 1963

Info system

A PUNCTURE OF THE HUGE "PROGRAMMING" BOOM?

Sidney L. Pressey
University of Arizona

Recently under the auspices of the U. S. Office of Education, "The first major exhibit of teaching machines and programmed instruction procedures, valued at $78,127, began a nationwide tour with a premiere in Washington" (Journal of the National Education Association, December, 1962, p.5). And a bulletin from that same office reported that a year ago there were 123 teaching machines in production or development commercially pricing as high as $5,000, and 630 programs, running as long as 16,000 "frames" (Finn and Perrin, 1962). Many millions of dollars are being invested in what has been advertised as "the greatest educational advance since the invention of printing;" and hundreds of psychologists and educators are rushing into the field. However, reviews of the most adequate appraising research have reported "programmed learning" often no more efficient than the usual study-reading and almost always more clumsy and more expensive (Gagne, 1962; Silberman, 1962; Pressey, 1963). The present "boom" might be followed by a "bust." This brief paper reports trial of an alternative auto-instructional procedure seeming of much promise; and it raises issues of learning theory and of educational practice of possible great importance.

The little experiment was very simple and direct. In the programed textbook Analysis of Behavior (Holland and Skinner, 1961) the first set,

REPRINTED BY PERMISSION
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN PRINTED EXACTLY AS RECEIVED FROM THE PERSON

dealing with "simple reflexes," consists of 54 frames on 8 pages; this material was converted into continuous discourse by simply filling in the blanks. The result was two pages of single-space typed matter totalling some 1110 words without paragraphs or other structure, very repetitious (thus the word "reflex" appeared 30 times "elicit" 31, "response" 37, "stimulus" 43), and with an odd choppy style presumably resulting from the overriding need to phrase each frame so as to call for a word or two of "constructed" response and to make each statement so very easy that errors would be kept to the theoretically-desired minimum. An amorphous repetitive conglomerate, to be fed to the student in 54 separate bits! Suppose one forgot learning theory and programing practices, and simply tried to present the same ideas as clearly and effectively as possible -- what would such a statement look like, and how effective would it be?

An effort so to do resulted in six succinct paragraphs totaling 360 words or less than a third the Holland-Skinner total of 1110, and going on little more than half a page; and several colleagues agreed that essentially everything in the Holland-Skinner set was included (with the exception of two questionable examples). Further, since preliminary trial showed both the Holland-Skinner program and the writer's statement not sufficiently to clarify certain issues, six objective "adjunct auto-elucidative questions" were prepared, for possible use at the end of the writer's transcription. For example, some students gave common learned responses as examples of simple

reflexes. So from their errors, the following question was made: "Which is a simple reflex? ( ) stopping at a red light, ( ) worring about work, (R) jumping at a sudden loud noise." The spaces in parenthesis were blacked over with pencil, and these the student erased until he found the "R" or right answer. The writer's statement plus six such questions all went on a single-space mimeographed pages. The issue then was as to whether the writer's brief statement, or that supplemented by his six auto-elucidative questions, could bring about anywhere near as much learning as the "program" of the two experts.

To obtain first evidence in the matter, some 30 students in one section of a required beginning course in education were given the Holland-Skinner programed set according to their procedure: each frame was read, the constructed answer written, and then checked. The materials were then removed, and each student asked to write his answers to two broad questions: "1. What are the important facts regarding simple reflexes, and technical terms regarding them? 2. Name as many human simple reflexes as you can, giving for each the stimulus and the response." Another presumably comparable section of the same course, of about the same number of students, read the writer's statement and then answered the same questions. A third section read that statement and went through his six auto-elucidative questions, then (the materials being removed) similarly answered the two essay-type questions. And these two questions were also answered by a fourth

section without any preparatory reading, as control to indicate pre-knowledge. The following simple table summarizes results, in terms of median number of grade-points on the two questions made by each section, and median time in minutes and seconds taken for each "auto-instructional" procedure.

Section	median time min. & sec.	points scored
Control group -- no preparation		3.6
Went through Holland-Skinner set	23 min.	10.5
Read the writer's statement	2' 30"	10.5
Statement plux 6 elucidative questions	4' 20"	11.4

The section which went through the Holland-Skinner unit made a clearly significant gain over the control. However, in one-tenth the time required to go through the "program," students simply reading the substance of it learned as much! When that substantive statement was supplemented by only six auto-elucidative questions, they did a bit better--not significantly so, but analysis showed that (for instance) the above-mentioned auto-instructional question differentiating simple reflexes from learned responses reduced mistakes in this matter on the end-test by over a half. If three of these questions had not been too easy, these students would probably have gained more.

In short, students do learn--and very rapidly--from silent reading without overt responding or confinement of their attention to seriatim presentation of "frames." Sentences clear and with attention-claiming

style and humor, paragraphs integrative of meanings, summaries b inging them together--such aids to understanding do seem to aid. Challenging questions, asked by a teacher or an auto-instructional device, which differentiate right from wrong ideas do appear to help in such differentiation. And it would seem evident that the meaningful learning here under consideration is not an accretion of bit-learnings stuck on by "reinforcements," but rather a progressive process of cognitive clarifications and integrations (Ausubel, 1962).

Nevertheless peicemeal-presentation programs mostly involving many write-in answers are being used by the many millions, considered the outstanding application of learning theory to education; and learning theorists seem mostly not to question the basic soundness of that application. The writer ventures the declaration that an all-important basic fault in the grand strategy and whole trend of American research and theory regarding learning is here come to its most bizarre and unfortunate fruition. The most influential portions of that research and theory are based on the false "generalization from comparative studies that there are no differences except ~~comparative~~ quantitative ones, between the learning of lower mammals and man," when the all-important fact is that "at the human level there have emerged capacities not approached by the lower animals" (Hilgard, 1956, pp. 460-1). Language and concepts, and such really extraordinary skills as silent assimilative reading, do make it possible for students to learn in a tenth the time some theories might lead one to expect. The learning theorists should try focusing on

such reading processes, rather than the maze-running of the rat.

And auto-instruction which facilitates and clarifies such study-reading processes, instead of clumsily fractionating them, can greatly thus aid, as suggested in the data of this little investigation but made much more clear in an earlier experiment under the direction of the writer (Pressey, 1950, pp. 440-4). All the readings and laboratory exercises in a course were covered in duplicate by adjunct auto-instructional "teach-tests." These, and all the materials of the course, were made available to superior students in an auto-instructional laboratory. There was no teaching, but an instructor in charge to help if asked. All the students finished the 12-week course in six weeks or less, and half made grades of "A". Such "auto-elucidation" in aid rather than replacement of readings and other educational materials and methods has been almost completely neglected in the past ten years. It is the purpose of this paper to direct attention back to these possibilities.

References.

Ausubel, D. P. A subsumption theory of meaningful verbal learning and retention. J. Gen. Psychol. 1962, 66, 213-234.

Finn, J. D. and Perrin, D. G. Teaching Machines and Programmed Learning: A Survey of the Industry, 1962 U. S. Office of Education, Washington, D. C.

Gagne, R. M. Military training and principles of learning. American Psychology, 1962, 17, 83-91

Hilgard, E. R. Theories of Learning (2nd Ed.) New York: Appleton-Century Crofts, 1956.

Holland, J. G. and Skinner, B. F. The Analysis of Behavior. New York: McGraw-Hill, 1961.

Pressey, S. L. Development and Appraisal of devices providing immediate automatic scoring of objective tests and concomitant self-instruction J. Psychology. 1950, 29, 417-447.

Pressey, S. L. Teaching machine (and Learning Theory) Crisis. J. Applied Psychology. February, 1963.

Silberman, H. F. Self-instructional devices and programed materials. Rev. Ed. Res. 1962, 32, 179-193.